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ICS 13.030.10; 13.030.20

English Version

**Characterization of waste - Sampling of waste materials - Part 4:
Guidance on procedures for sample packaging, storage,
preservation, transport and delivery**

Caractérisation des déchets - Prélèvement des déchets -
Partie 4: Guide relatif aux procédures d'emballage, de
stockage, de conservation, de transport et de livraison des
échantillons

Charakterisierung von Abfall - Probenahme - Teil 4:
Verpackung, Lagerung, Konservierung, Transport und
Lieferung von Proben

This Technical Report was approved by CEN on 21 February 2006. It has been drawn up by the Technical Committee CEN/TC 292.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This Technical Report (CEN/TR 15310-4:2006) has been prepared by Technical Committee CEN/TC 292 "Characterization of waste", the secretariat of which is held by NEN.

This Technical Report has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This Technical Report is one of a series of five, dealing with sampling techniques and procedures, which provide essential information for the application of the EN-standard:

EN 14899 Characterisation of Waste - Sampling of waste materials - Framework for the preparation and application of a Sampling Plan

The principal component of the EN standard is the mandatory requirement to prepare a Sampling Plan. This EN 14899 standard can be used to:

- produce standardised sampling plans for use in regular or routine circumstances (i.e. the elaboration of daughter/derived standards dedicated to well defined sampling scenarios);
- incorporate specific sampling requirements into national legislation;
- design and develop a Sampling Plan on a case by case basis.

The Technical Reports display a range of potential approaches and tools to enable the project manager to tailor his sampling plan to a specific testing scenario (i.e. a 'shop shelf' approach to sampling plan development for waste testing). This approach allows flexibility in the selection of the sampling approach, sampling point, method of sampling and equipment used.

This Technical Report describes the boundary conditions and procedures, appropriate for application in the field, for the packaging, preservation, short-term storage and transport of samples to assist in maintaining their integrity prior to delivery at the laboratory. The laboratory facility should be consulted in the selection of the most appropriate procedure to ensure compatibility with the chosen analytical methodology and parameters to be tested as defined in EN 14899 - Framework standard.

This report does not attempt to provide a definitive procedure for each and every situation that may arise from sampling a given waste type or specific analytical requirement, rather it aims to expose the factors that influence the selection of these practical field activities to ensure the most appropriate procedure is selected for any given sampling scenario. The most appropriate approach, tools, and methodology, in the absence of an existing recognised Sampling Plan should be chosen on a scenario-specific basis. However, this does not present a barrier to technical innovation, and there is no reason why methodologies other than those detailed in this Technical Report cannot be substituted.

Introduction

Wastes are materials, which the holder discards, or intends or is required to discard, and which may be sent for final disposal, reuse or recovery. Such materials are generally heterogeneous and it will be necessary therefore to specify in the testing programme the amount of material for which the characteristics of interest need to be defined. The testing of wastes allows informed decisions to be made on how they should be treated (or not), recovered or disposed. In order to undertake valid tests, some sampling of the waste is required.

The principal component of the standard EN 14899 is the mandatory requirement to prepare a Sampling Plan, within the framework of an overall testing programme as illustrated in Figure 1 of EN 14899:2005. This standard can be used to:

- produce standardised sampling plans for use in regular or routine circumstances (i.e. the elaboration of daughter/derived standards dedicated to well defined sampling scenarios);
- incorporate specific sampling requirements into national legislation;
- design and develop a Sampling Plan on a case by case basis.

The development of a Sampling Plan within this framework involves the progression through three steps or activities.

- 1) Define the Sampling Plan;
- 2) Take a field sample in accordance with the Sampling Plan;
- 3) Transport the laboratory sample to the laboratory.

This Technical Report provides information to support Key Steps 2 and 3 of the Sampling Plan process map and elaborates on methods and boundary conditions for preserving, packaging and storing samples to preserve their integrity, in addition to the transportation and delivery of a sample to the designated analytical facility.

Sample integrity may be compromised if insufficient attention is paid to correct packaging, preservation, and storing and transport techniques. This may result in a sample, which is not representative of the sample population. The selection of the most appropriate procedure should be in collaboration with the laboratory facility designated to undertake testing to ensure compatibility with the chosen analytical methodology and parameters to be tested. Specifically this Technical Report supports 4.2.8.3 of the Framework Standard.

This Technical Report should be read in conjunction with the Framework Standard for the preparation and application of a Sampling Plan as well as the other Technical Reports that contain essential information to support the Framework Standard. The full series comprises:

EN 14899 Characterization of waste - Sampling of waste materials - Framework for the preparation and application of a Sampling Plan;

CEN/TR 15310-1, Characterization of waste – Sampling of waste materials – Part 1: Guidance on selection and application of criteria for sampling under various conditions;

CEN/TR 15310-2, Characterization of waste – Sampling of waste materials – Part 2: Guidance on sampling techniques;

CEN/TR 15310-3, Characterization of waste – Sampling of waste materials – Part 3: Guidance on procedures for sub-sampling in the field;

CEN/TR 15310-4, Characterization of waste – Sampling of waste materials – Part 4: Guidance on procedures for sample packaging, storage, preservation, transport and delivery;

CEN/TR 15310-5, Characterization of waste – Sampling of waste materials – Part 5: Guidance on the process of defining the Sampling Plan.

The Technical Reports contain procedural options (as detailed in Figure 2 of EN 14899:2005) that can be selected to match the sampling requirements of any testing programme.

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1 Scope

This Technical Report describes procedures for the packaging, preservation, short-term storage and transport of both solid and liquid waste samples, including paste-like substances and sludges. Where available and appropriate for field application, requirements for specific storage conditions and/or preservation methods should be selected from the chosen analytical standard and collaboration with the testing laboratory.

NOTE 1 This Technical Report provides a shop shelf of example sampling techniques that can be selected to meet a wide range of sampling situations. For a specific situation one of the presented procedures may be appropriate.

NOTE 2 The procedures listed in this Technical Report reflect current best practice, but these are not exhaustive and other procedures may be equally relevant.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13965-1:2004, *Characterization of waste - Terminology - Part 1: Material related terms and definitions*

EN 13965-2:2004, *Characterization of waste - Terminology - Part 2: Management related terms and definitions*

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3 Terms and definitions

For the purposes of this Technical Report, the terms and definitions given in EN 13965-1:2004 and EN 13965-2:2004 and the following apply..

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3.1 analytical laboratory

identified laboratory, which is to undertake the chemical, biological or physical analysis of samples

3.2 constituent

property or attribute of a material that is measured, compared or noted

3.3 delivery

transfer of custody of the sample

3.4 field sample

quantity (mass or volume) of material obtained through sampling without any sub-sampling

3.5 laboratory sample

sample(s) or sub-sample(s) sent to or received by the laboratory.

[IUPAC, definition 2.5.5]

NOTE 1 When the laboratory sample is further prepared (reduced) by subdividing, mixing, grinding, or by combinations of these operations, the result is the test sample. When no preparation of the laboratory sample is required, the laboratory sample is the test sample.

NOTE 2 The laboratory sample is the final sample from the point of view of sample collection but it is the initial sample from the point of view of the laboratory.

3.6

packaging

act of placing a sample into an appropriate sample container for transport and/or storage
[ISO 11074:2005]

3.7

preservation

any procedure used to stabilise a sample in such a way that the properties under examination are maintained stable from the collection step until preparation for analysis
[ISO 11074:2005]

3.8

sample

portion of material selected from a larger quantity of material
[ISO 11074:2005]

NOTE 1 The manner of selection of the sample should be described in a sampling plan.

NOTE 2 The use of the term 'sample' should be supported with a preface as far as possible as it does not indicate to which step of the total sampling procedure it is related when used alone e.g. field sample, laboratory sample.

3.9

storage

process and the result of keeping a sample available under predefined conditions for a usually specified time interval between collection and further treatment of the sample
[ISO 11074:2005]

3.10

transport

act of transferring a sample from the locality of sampling to the place of subsequent treatment (e.g. laboratory, soil-specimen bank etc.)
[ISO 11074:2005]

4 Packing and labelling the sample

4.1 Selecting a sample container

4.1.1 General

Sample containers can be made from many different types of materials, some of which may react or contaminate a specific type of sample. To avoid any accidental contamination by the sample container or derogation of the sample the project manager should seek scientific advice, usually from the receiving laboratory, regarding the type and size of sample(s) and container(s), appropriate preservation method(s) if applicable, maximum storage time prior to analysis, and the labelling system. The maximum storage time prior to analysis will indicate the period of time available before the sample has to arrive at the laboratory. In general, this period has to be as short as possible. Once the details have been agreed, the Sampler should follow the methods detailed in the sampling plan.

The purpose of the sample container is to protect the sample during transport and storage until it is further treated or analysed. A container should be compatible with the nature of the material sampled and the components to be analysed. In general:

— collect samples for inorganic analysis in plastic containers;

NOTE It is common practice to include low-density polyethylene bottles or tubs. Strong polyethylene plastic bags are useful for bulky solid samples. Samples should be collected for organic analysis in glass containers.

- select a sample container having a size relative to the volume of the required sample;
- select a sample container capable of being sealed. Tamperproof seals are commonly used when performing regulatory sampling.

Where specialised containers and preservatives are advised the analytical laboratories should be encouraged to provide containers that conform to the characteristics of the analytical procedure to be used.

Table A.1 details types of containers, preservation and storage conditions for different types of parameters associated with a particular analysis or test.

4.1.2 Type of container

The following points should be considered when selecting and preparing sample containers:

- adsorption into the walls of the container;
- contamination of the container prior to sampling by improper cleaning;
- contamination of the sample by the material of which the container is made;
- reaction between constituents of the sample and the container;
- resistance to temperature extremes; **(standards.iteh.ai)**
- resistance to breakage;
- water and gas tightness; <https://standards.iteh.ai/catalog/standards/sist/b944d896-0ba4-422a-849b-f61360273bf/sist-tp-cen-tr-15310-4-2007>
- ease of reopening;
- size, shape and mass volume;
- availability;
- cost.

4.1.3 Shape and size of container

Consultation should be undertaken with the analytical laboratory regarding type and size of sample containers. The sample size is a function of the necessary mass required to complete the analytical suite and by any requirement to store sample for investigation at a later date. The Project Manager should then select the type and size of container and define this within the Sampling Plan.

- obtain instruction from the analytical laboratory on appropriate headspace above the sample;
- select the shape and size of container such that the volume of headspace does not prevent changes in the sample. Wide neck rigid containers are useful to aid sample handling;
- either completely fill the container or allow headspace as appropriate for the material being sampled and determinations to be analysed.

NOTE Some headspace volume is required above samples, which are biologically reactive, or have the potential to generate gas or to significantly change in volume with relatively small changes of temperature. Air space should be

minimised, to prevent significant oxidation and/or carbonation reactions, both at the top of the container and for granular materials between the particles. When freezing is used as a preservation method, some additional space is needed within the container to allow for expansion. The use of glass is not advisable when freezing aqueous solutions.

4.1.4 Preparation of sample containers

Commonly, instruction on the use of appropriate cleaning protocols can be obtained from the analytical laboratory.

NOTE The choice of cleaning method will depend on the components to be analysed. Containers may be cleaned with mixtures of acids followed by rinsing with de-ionised water. Samples that are to be analysed for organic components may be stored in solvent-rinsed containers and/or calcinations oven. Cleaning procedures may differ depending on the type of waste to be packed and the components to be analysed. Advice should be sought from the analytical laboratory or other experts in order to establish the most suitable procedure in each case. In general, the reuse of sample containers is not advised.

4.2 Packaging specific types of waste

4.2.1 General packaging

Using the guidance given in Table A.1, select a container compatible with the analytical determinants.

4.2.2 Hazardous Wastes

Advice should always be sought before handling hazardous wastes and all relevant health and safety regulations should be followed explicitly.

4.2.3 Packaging of mobile liquid waste

Refer to 4.2.1

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4.2.4 Packaging of liquid and solids rendered mobile by heat

When packaged after pre-heating, place the sample in the container and allowed to cool before sealing the container.

Refer to 4.2.1

4.2.5 Packaging of viscous liquids

Place samples with a melting point within the range of anticipated ambient temperature in sealable, wide necked containers.

Refer to 4.2.1

4.2.6 Packaging of sludges

Refer to 4.2.1

4.2.7 Packaging of paste-like substances

Place samples with a melting point within the range of anticipated ambient temperature in sealable, wide necked containers.

Refer to 4.2.1